

CLAIMS

What is claimed is:

1. A seal assembly comprising:

a leaf seal including a plurality of staggered leaf seal members, the leaf seal including a fixed portion that is angled relative to a free portion thereof; and

a support coupled to the leaf seal for supporting the free portion, the support having a support portion facing a high pressure side of the leaf seal,

wherein the free portion contacts a distal end of the support portion in an operative state and is out of contact with the distal end in an inoperative state.
2. The seal assembly of claim 1, each leaf seal member includes a first layer including a first material addressing a high pressure side of the leaf seal and a second layer of a second material addressing a low pressure side of the leaf seal, wherein the first material has a lower coefficient of thermal expansion than the second material.
3. The seal assembly of claim 1, wherein the support portion includes a curved surface extending from a proximate end of the support portion to the distal end, and the free portion extends tangentially from the curved surface in the inoperative state.
4. The seal assembly of claim 3, wherein the proximate end is coupled to a mount portion of the support that mounts the support to a stationary component.

5. The seal assembly of claim 1, wherein the free portion is closer to a component to be sealed against during the operative state than in the inoperative state.
6. The seal assembly of claim 1, wherein the plurality of staggered leaf seal members are provided by a spiral of a single strip of material.
7. The seal assembly of claim 1, wherein the plurality of staggered leaf seal members are fixed together at the fixed portion by a weld.
8. The seal assembly of claim 1, wherein the fixed portion is positioned substantially perpendicular to a longitudinal axis of a component to be sealed against, and the free portion is, in the inoperative state, angled out-of-plane relative to the fixed portion and slidably engages to seal the component to be sealed against at an angle relative to the longitudinal axis.

9. A seal assembly for sealing against a rotatable component, the seal assembly comprising:
a leaf seal including a plurality of leaf seal members, the leaf seal including a fixed portion that is angled relative to a free portion thereof; and

wherein the fixed portion is positioned substantially perpendicular to a longitudinal axis of the rotatable component, and the free portion is, in an inoperative state, angled out-of-plane relative to the fixed portion and slidably engages to seal against the rotatable component at an angle relative to the longitudinal axis in an operative state.

10. The seal assembly of claim 9, further comprising a support for supporting the free portion of each seal member, the support including a support portion facing a high pressure side of the leaf seal,

wherein the free portion contacts a distal end of the support portion in the operative state and is out of contact with the distal end in the inoperative state.

11. The seal assembly of claim 10, wherein the distal end of the support portion is thinner than a proximate end of the support portion, and the proximate end is in contact with the free portion in the inoperative state.

12. The seal assembly of claim 11, wherein the support portion includes a curved surface extending from the proximate end to the distal end.

13. The seal assembly of claim 11, wherein the proximate end of the support portion is coupled to a mount portion of the support that mounts the support to a stationary component.

14. The seal assembly of claim 10, wherein the free portion is closer to the rotatable component during the operative state than in the inoperative state.
15. The seal assembly of claim 9, further comprising a holder for mounting the seal assembly to a stationary component, wherein the holder includes a projection for protecting the free portion.
16. The seal assembly of claim 9, wherein the fixed portion is provided by an arcuate member in each leaf seal member.
17. The seal assembly of claim 9, wherein the free end is at least one of axially parallel a surface of the rotatable component, and circumferentially parallel a surface of the rotatable component.
18. The seal assembly of claim 9, wherein each leaf seal member includes a first layer including a first material addressing a high pressure side of the leaf seal and a second layer of a second material addressing a low pressure side of the leaf seal, wherein the first material has a lower coefficient of thermal expansion than the second material.

19. A rotary machine comprising:
- a rotatable component and a non-rotatable component, the components lying about a common axis;
 - a seal assembly between the components, the seal assembly including:
 - a leaf seal including a plurality of staggered leaf seal members, the leaf seal including a fixed portion that is angled relative to a free portion thereof; and
 - a support coupled to the leaf seal for supporting the free portion, the support having a support portion facing a high pressure side of the leaf seal,
 - wherein the free portion contacts a distal end of the support portion in an operative state and is out of contact with the distal end in an inoperative state.
20. The rotary machine of claim 19, wherein each leaf seal member includes a first layer including a first material addressing a high pressure side of the leaf seal and a second layer of a second material addressing a low pressure side of the leaf seal, wherein the first material has a lower coefficient of thermal expansion than the second material.
21. The rotary machine of claim 19, wherein the support portion includes a curved surface extending from the proximate end to the distal end.
22. The rotary machine of claim 19, wherein the free portion is closer to a component to be sealed against during the leaf seal operative state than in the leaf seal inoperative state.

23. The rotary machine of claim 19, wherein the fixed portion is positioned substantially perpendicular to a longitudinal axis of a component to be sealed against, and the free portion is, in the inoperative state, angled out-of-plane relative to the fixed portion and slidably engages to seal the component to be sealed against at an angle relative to the longitudinal axis in the operative state.

24. A method of fabricating a seal assembly for sealing pressurized chambers of a rotary machine having a stator body and a rotor, the method comprising the steps of:

(a) forming a leaf seal including a plurality of leaf seal members, the leaf seal including a fixed portion that is angled relative to a free portion thereof in an inoperative state; and

(b) coupling the leaf seal to a support, including a support portion, such that the free portion contacts a distal end of the support portion in an operative state and is out of contact with the distal end in the inoperative state.

25. A support for use with a leaf seal having a fixed portion and a free portion angled relative to the fixed portion, the support including:

a mount portion for mounting the fixed portion; and

a support portion for supporting the free portion of the leaf seal, the support portion including a proximate end that contacts the free portion in an operative state and an inoperative state of the leaf seal, and a distal end that contacts the free portion in an operative state and is out of contact with the distal end in an inoperative state of the leaf seal.

26. A seal assembly comprising:

a leaf seal including a plurality of staggered leaf seal members, the leaf seal including a fixed portion that is angled relative to a free portion thereof; and

a support coupled to the leaf seal for supporting the free portion,

wherein each leaf seal member includes a first layer including a first material addressing a high pressure side of the leaf seal and a second layer of a second material addressing a low pressure side of the leaf seal, wherein the first material has a lower coefficient of thermal expansion than the second material.